

CLAIM AMENDMENTS

IN THE CLAIMS

This listing of the claims will replace all prior versions, and listing, of claims in the application or previous response to office action:

1-11. (Cancelled)

12. (Currently Amended) A direct injection internal combustion engine system, comprising:

at least one cylinder having a piston moving along an axis;

a gas inlet and a gas outlet leading to an exhaust passage;

an No_x reducing converter in said exhaust passage; and

intake and exhaust valves associated with said cylinder and said gas inlet and gas outlet, arranged to provide internal exhaust-gas recirculation;

wherein said cylinder, said gas inlet and said gas outlet are arranged to provide layered lean operation of said engine; and

wherein said inlet passage is arranged to provide ~~swirl~~a tumble movement in incoming gas having a swirl axis substantially transverse to said piston axis in such a way that and wherein in combination a subsequent charging movement of the piston causes an intermixture of residual exhaust gas with said incoming gas.

13. (Cancelled)

14. (Currently Amended) Internal combustion engine according to Claim ~~13~~12 wherein a tumble plate is provided in said gas inlet.

15. (Previously Presented) Internal combustion engine according to claim 12 wherein said engine is an Otto engine.

16. (Previously Presented) Internal combustion engine according to claim 12 wherein said-passage is arranged for a layered charging.

17. (Previously Presented) Internal combustion engine according to claim 12 wherein there is further provided an arrangement for external exhaust-gas recirculation.

18. (Previously Presented) Internal combustion engine according to Claim 17, wherein the external exhaust-gas recirculation arrangement includes an arrangement for cooling recirculated gases.

19. (Previously Presented) Internal combustion engine according to Claim 17, wherein the external exhaust-gas recirculation arrangement includes a control valve.

20. (Currently Amended) Internal combustion engine according to claim 12 wherein the swirl-tumble movement has an axis which lies in the region of 75° to 105° of said piston axis.

21. (Previously Presented) Internal combustion engine according to claim 12 wherein said reducing converter comprises a NOx storage catalyst.

22. (Previously Presented) Internal combustion engine according to claim 21 wherein said storage catalyst is controlled by a NOx sensor.

23. (Previously Presented) Internal combustion engine according to claim 12 wherein there is provided an arrangement for controlling internal exhaust-gas recirculation by adjustment of intake valve opening times in the direction of early.

24. (Currently Amended) A direct injection internal combustion engine system, comprising:

at least one cylinder having a piston moving along an axis;

a gas inlet and a gas outlet leading to an exhaust passage;

a preliminary No_x catalyst in said exhaust passage followed downstream by an No_x storage catalyst;

an external exhaust-gas recirculation line comprising an exhaust-gas cooler and a control valve wherein said exhaust-gas recirculation line couples said gas outlet with said gas inlet;

a lambda probe arranged between said gas outlet and said preliminary No_x catalyst;

a temperature sensor arranged between said preliminary No_x catalyst and said No_x storage catalyst;

a No_x sensor arranged downstream said No_x storage catalyst; and

intake and exhaust valves associated with said cylinder and said gas inlet and gas outlet, arranged to provide internal exhaust-gas recirculation;

wherein said cylinder, said gas inlet and said gas outlet are arranged to provide layered lean operation of said engine;

wherein said inlet passage is arranged to provide ~~swirl~~a tumble movement in incoming gas having a swirl axis substantially transverse to said piston axis ~~and wherein in combination in such a way that~~ a subsequent charging movement of the piston causes an intermixture of residual exhaust gas with said incoming gas; and wherein the system further comprises

a control unit receiving signals from said sensors and said probe for controlling said direct injection and said intermixture.

25. (Currently Amended) A direct injection internal combustion engine system, comprising:

at least one cylinder having a piston moving along an axis;

a gas inlet channel and a gas outlet leading to an exhaust passage;

an No_x reducing converter in said exhaust passage; and

intake and exhaust valves associated with said cylinder and said gas inlet channel and gas outlet, arranged to provide internal exhaust-gas recirculation;

wherein said cylinder, said gas inlet channel and said gas outlet are arranged to provide layered lean operation of said engine; and

wherein said inlet channel comprises a controllable tumble plate which can be laid against a wall of said inlet channel to allow incoming gas to pass by or can be set to provide ~~swirl~~ a tumble movement in incoming gas having a swirl axis substantially transverse to said piston axis and arranged to cause an intermixture of residual exhaust gas with said incoming gas.

26. (Currently Amended) A direct injection internal combustion engine system, comprising:

at least one cylinder having a piston moving along an axis;

a gas inlet channel and a gas outlet leading to an exhaust passage;

a preliminary No_x catalyst in said exhaust passage followed downstream by an No_x storage catalyst;

an external exhaust-gas recirculation line comprising an exhaust-gas cooler and a control valve wherein said exhaust-gas recirculation line couples said gas outlet with said gas inlet channel;

a lambda probe arranged between said gas outlet and said preliminary No_x catalyst;

a temperature sensor arranged between said preliminary No_x catalyst and said No_x storage catalyst;

a No_x sensor arranged downstream said No_x storage catalyst; and

intake and exhaust valves associated with said cylinder and said gas inlet channel and gas outlet, arranged to provide internal exhaust-gas recirculation;

wherein said cylinder, said gas inlet channel and said gas outlet are arranged to provide layered lean operation of said engine;

wherein said inlet channel comprises a controllable tumble plate which can be laid against a wall of said inlet channel to allow incoming gas to pass by or can be set to provide ~~swirl~~ a tumble movement in incoming gas having a swirl axis substantially transverse to said piston axis and arranged to cause an intermixture of residual exhaust gas with said incoming gas; and wherein the system further comprises

a control unit receiving signals from said sensors and said probe for controlling said direct injection and said intermixture.